

PATENT SPECIFICATION



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795,245

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International Classification:—B23d.

COMPLETE SPECIFICATION

New or improved means for controlling the working of Strip Material

We, PRESS EQUIPMENT LIMITED, a British Company, of 76—78, Hunters Vale, Birmingham 19, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to new or improved means for controlling the working of strip material in a press or other machine which consumes the strip intermittently, that is, in which the strip is momentarily arrested while at least one operation is performed on the portion of the strip which has been fed into the machine.

The specification of our Patent No. 780,861 describes and claims feeding mechanism for feeding metal strip to a power press or like machine in which the strip is fed through straightening or feeding rolls which are driven by an electric motor through a transmission including a variable speed hydraulic transmission unit of which the effective gear ratio is varied by means influenced by the position of a portion of the strip between the rolls and the machine to adjust the rate of feed in accordance with the rate at which the strip is consumed by the machine.

According to our present invention strip fed to a machine by power-driven feed rolls or equivalent feeding means is arranged to abut against a stop which causes the formation of a bow in the strip between the feeding means and the machine, and the bow when it reaches a predetermined dimension actuates a detecting device which stops or slows down the feeding of the strip and initiates a further operation, such as the setting in motion of the machine to perform an operation or operations on the strip.

The detecting device may be a finger or other feeler which is engaged mechanically by the bow in the strip or it may be an electric contact, a beam of light which is directed on to a photo-electric cell and is inter-

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rupted by the bow, or any other convenient device.

When the operation has been performed the resilience of the bow feeds the free end of the strip forwardly again, and as the bow flattens the feed for the strip is started and continues until the strip engages the stop and the bow is re-formed to a height sufficient to affect the detecting device which causes the feed to be stopped and another operation to be initiated.

The detecting device in effect acts as a trigger to control the application of energy from any convenient source to the carrying out of operations on the strip including the intermittent feeding of the strip at a rate which corresponds to that at which it is consumed and which may control the rate at which it is consumed.

For example, if the rate at which the strip is fed between operations is increased the bow in the strip will form more rapidly and the intervals between the performance of successive operations will be reduced.

To arrest the feed the detector device may be arranged to switch off a motor driving feed rolls or the like, or it may control the disengagement of a friction, magnetic, or hydraulic clutch, or the movement into neutral of an hydraulic variable speed driving unit. The controls may be effected directly or through switches or through electric, pneumatic or other relays.

The detecting device may at the same time initiate the application of a brake to the feeding mechanism to bring that mechanism rapidly to rest as soon as the drive has been interrupted.

In addition to arresting the mechanism for feeding the strip the detecting device automatically initiates the performance of one or more operations on the strip. For example, in feeding strip to a power press having a crank-shaft driven through a clutch from a continuously rotating flywheel the detecting device may be arranged to open a valve ener-

gising a fluid-pressure actuator for the clutch to cause the press to operate.

In an hydraulically operated press the detecting device may actuate directly or through a relay the control or control circuit for the press.

The strip may be taken from a coil or other bulk supply, and as the strip is fed to the machine while the machine is opening and before the next operation is initiated any required length of strip can be fed according to the length on which an operation is performed on each stroke or cycle of the machine.

The time interval between the completion of the working stroke or cycle of the machine and the feeding of the next length of strip will depend on various factors, and in some cases may be reduced down to the limiting condition in which the feeding of the next length of strip and the formation of the bow has taken place as or before the machine has completed its working stroke or cycle so that the next stroke or cycle will follow immediately and the machine will run continuously.

It will be appreciated that as our improved method of controlling the working of strip material comprises means for controlling both the feeding of the strip and the operation of the machine the process is completely automatic and the operator has only to see that the supply of strip is maintained.

One practical application of our invention and a modification thereof are illustrated diagrammatically in the accompanying drawings in which:—

Figure 1 is a side elevation of an assembly showing diagrammatically the essential parts of the controlling means.

Figure 2 is a fragmentary view showing the application of the control to a press for cutting off lengths of strip.

In Figure 1, 10 is a conventional coil cradle adapted to receive and rotate a coil of metal strip 11. The strip 11 as it comes off the coil passes through power-driven straightening and feed rolls in a housing 12 mounted on the frame of the coil cradle. The rolls feed the strip over a table 13 to press tools by which an operation is performed on the strip. The stationary bottom tool is shown at 14, and 15 is the reciprocating top tool which is actuated mechanically or by fluid pressure in a power press of any convenient type.

A stop 16 is provided just beyond the tools.

In normal operation the feed rolls feed the strip forwardly until its free end engages the stop 16. This causes the formation of a bow 17 in the strip between the feed rolls and the tools and when the bow reaches a predetermined height it engages a trip finger 18 of a switch 19 and closes the switch. This closes a circuit between a current source such as a battery 20 and solenoids 21 and 22. When

the solenoid 21 is energised it breaks the connection between contacts 23 in the circuit of an electric motor driving the feed rolls so that the feeding of the strip is stopped. The solenoid 22 closes contacts 24 which, directly or through a relay, set the press in motion to make a single operative stroke and perform an operation on the portion of the strip between the tools. When the operation has been completed and that portion of the strip is ejected or otherwise discharged when the tools open the resilience of the bow moves the free end of the strip forwardly again, and as the bow flattens it moves away from the finger 18 so that the switch 19 opens and the solenoids 21 and 22 are de-energised. This causes the closing of the contacts 23 and the feed rolls are started to feed the strip forwardly until its free end engages the stop 16. The bow then re-forms and the cycle is repeated.

Figure 2 shows an arrangement designed for cutting off predetermined lengths of strip. The strip 30 is fed by feed rolls 31 over a table 32 and over a fixed shear blade 33 to a stop 34 located at a distance from the blade 33 equal to the length of strip to be cut off by a power-operated vertically movable blade 35 on the ram or slide of a press. When the end of the strip engages the stop 34 an upward bow 36 forms in the part of the strip over the table and when the bow reaches a predetermined height it engages a finger 37 and opens a switch 38 which causes the stopping of the feed rolls and the setting in motion of the press to bring down the moving shear blade 35. When the portion of the strip between the shear blade 33 and the stop has been cut off and the blade 35 has moved upwardly again clear of the blade 33 the bow flattens, the switch 38 closes, and the feed rolls are started to feed the strip forwardly again to the stop. The position of the stop is preferably adjustable within wide limits to allow the cutting of lengths of strip to suit various requirements.

It will be appreciated that each time the feed is started it feeds the strip forwardly until the free end of the strip engages the stop and the bow has formed to a sufficient height to stop the feed.

Any over-run of the feed simply increases the height of the bow and when the press has completed its operation the bow flattens and the free end of the strip moves forwardly before the feed is restarted so that the full length of strip required by the machine is fed during each cycle but any variation in the additional strip fed is taken care of by the bow and is not cumulative. To reduce the over-run of the feed rolls when the drive is interrupted the detecting device may initiate the application of a brake to the feeding mechanism to bring it rapidly to rest.

In the embodiments described above the

bow in the strip when it reaches a predetermined dimension stops the feed rolls for feeding the strip to the machine, the feed rolls being re-started when the bow flattens, but if the feed rolls are driven through a variable speed hydraulic or other gear the formation of the bow may simply slow down the rate of feed instead of stopping the feed rolls, the rate of feed being increased again if necessary when the bow flattens.

What we claim is:—

1. Means for controlling the working of strip material in a press or other machine which consumes the strip intermittently, in which power driven feeding mechanism feeds the strip against a stop which causes the formation of a bow in the strip between the feeding mechanism and the machine, and the bow on reaching a predetermined dimension actuates a detecting device which stops or slows down the feed and initiates a further operation such as the setting in motion of the machine.

2. Means as claimed in Claim 1 in which the bow in the strip on reaching a predeter-

mined dimension actuates a switch controlling electrical means for cutting off the drive to the feeding mechanism and for setting the machine in motion.

3. Means as claimed in Claim 1 in which the position of the stop is adjustable to control the length of strip fed for each operation of the machine.

4. Means as claimed in Claim 1 in which the detecting device when stopping the feeding mechanism also cause the application of a brake to bring the mechanism rapidly to rest.

5. Means for controlling the working of strip material substantially as described with reference to Figure 1 of the accompanying drawings.

6. Means for controlling the cutting off of strip material in predetermined lengths substantially as described with reference to Figure 2 of the accompanying drawings.

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PROVISIONAL SPECIFICATION

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We, PRESS EQUIPMENT LIMITED, a British Company, of 76—78, Hunters Vale, Birmingham 19, do hereby declare this invention to be described in the following statement:—

This invention relates to new or improved means for controlling the working of strip material in a press or other machine which consumes the strip intermittently, that is, in which the strip is momentarily arrested while at least one operation is performed on the portion of the strip which has been fed into the machine.

According to our invention strip fed to a machine by feed rolls or any other convenient feeding means is arranged to abut against a stop which causes the formation of a bow in the strip between the feeding means and the machine, and the bow when it reaches a predetermined dimension actuates a detecting device which stops the feeding of the strip and initiates one or more operations of which one may be the setting in motion of the machine to perform an operation or operations on the strip.

The detecting device may be a finger or other feeler which is engaged mechanically by the bow in the strip or it may be an electric contact, a beam of light which is directed on to a photo-electric cell and is interrupted by the bow, or any other convenient device.

When the operation has been performed the resilience of the bow feeds the free end of the strip forwardly again, and as the bow flattens the feed for the strip is started and continues until the strip engages the stop and

the bow is re-formed to a height or depth sufficient to affect the detecting device which causes the feed to be stopped and another operation to be initiated.

The detecting device in effect acts as a trigger to control the application of energy from any convenient source to the carrying out of operations on the strip including the intermittent feeding of the strip at a rate which corresponds to that at which it is consumed and which may control the rate at which it is consumed.

For example, if the rate at which the strip is fed between operations is increased the bow in the strip will form more rapidly and the intervals between the performance of successive operations will be reduced.

To arrest the feed the detector device may be arranged to switch off a motor driving feed rolls or the like, or it may control the disengagement of a friction, magnetic, or hydraulic clutch, or the movement into neutral of an hydraulic variable speed driving unit. The controls may be effected directly or through switches or through electric, pneumatic or other relays.

The detecting device may at the same time initiate the application of a brake to the feeding mechanism to bring that mechanism rapidly to rest as soon as the drive has been interrupted.

In addition to arresting the mechanism for feeding the strip the detecting device automatically initiates the performance of one or more operations on the strip. For example, in feeding strip to a power press having a

crank-shaft driven through a clutch from a continuously rotating flywheel the detecting device may be arranged to open a valve energising a fluid-pressure actuator for the clutch
5 to cause the press to operate.

In an hydraulically operated press the detecting device may actuate directly or through a relay the control or control circuit for the press.

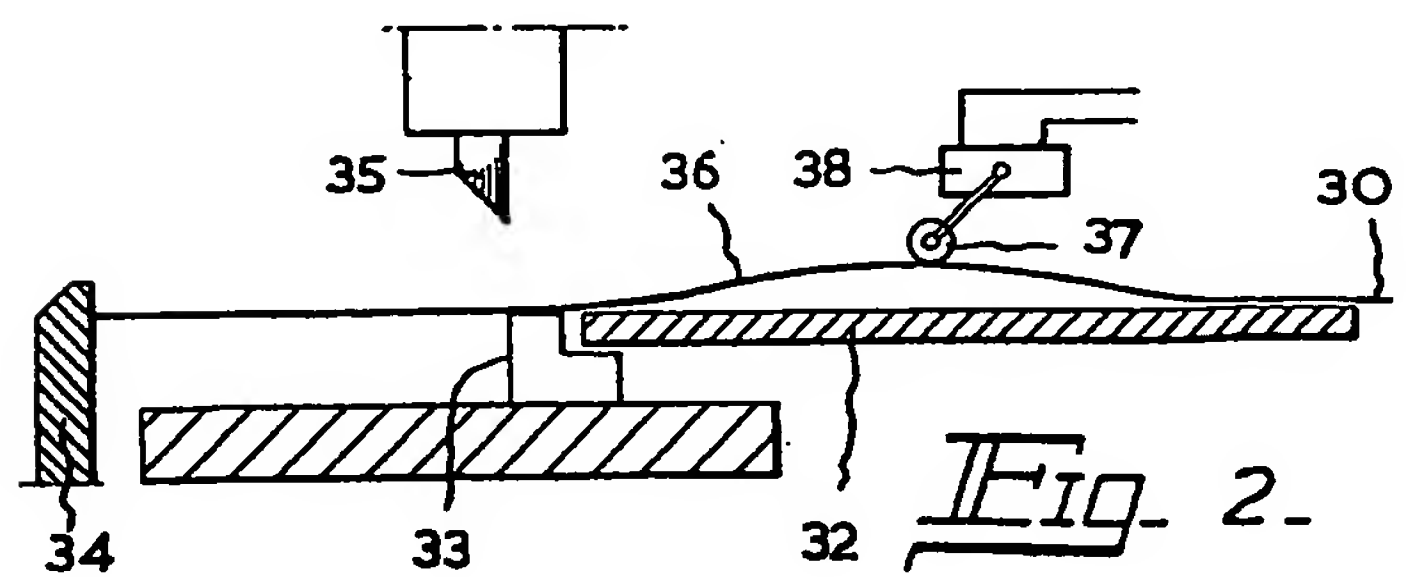
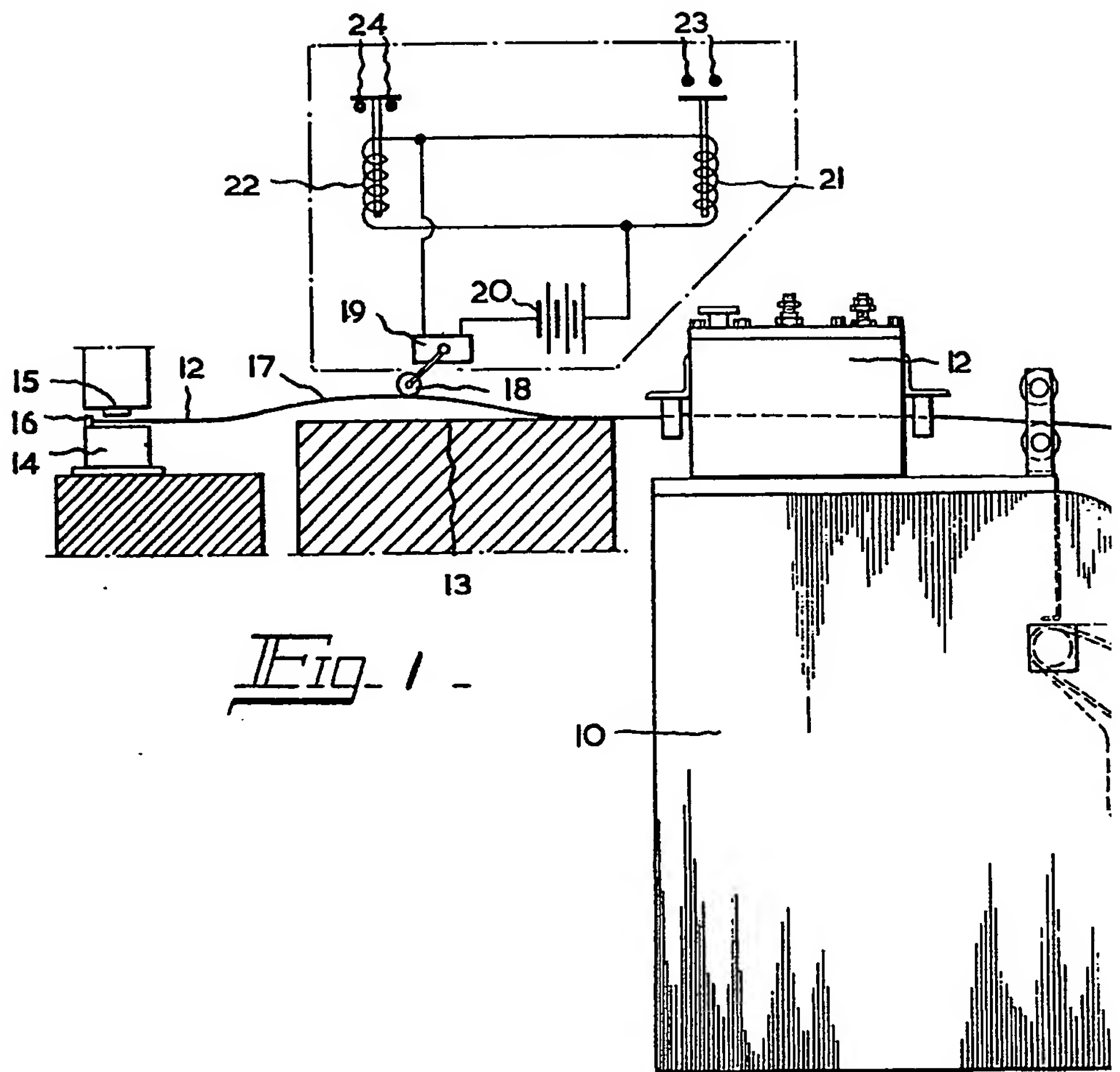
10 The strip may be taken from a coil or other bulk supply, and as the strip is fed to the machine while the machine is opening and before the next operation is initiated any required length of strip can be fed according to
15 the length on which an operation is performed on each stroke or cycle of the machine.

In some machines the feeding of the next length of the strip and the formation of the bow may have taken place before the
20 machine has completed its stroke or cycle so that the next stroke or cycle will follow immediately and the machine will run continuously.

It will be appreciated that as our improved
25 method of controlling the working of strip material comprises means for controlling both the feeding of the strip and the operation of the machine the process is completely automatic and the operator has only to see
30 that the supply of strip is maintained.

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1 SHEET

COMPLETE SPECIFICATION
*This drawing is a reproduction of
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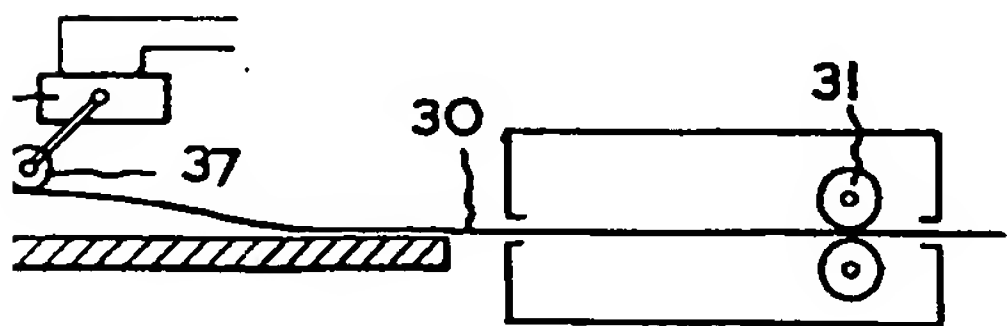
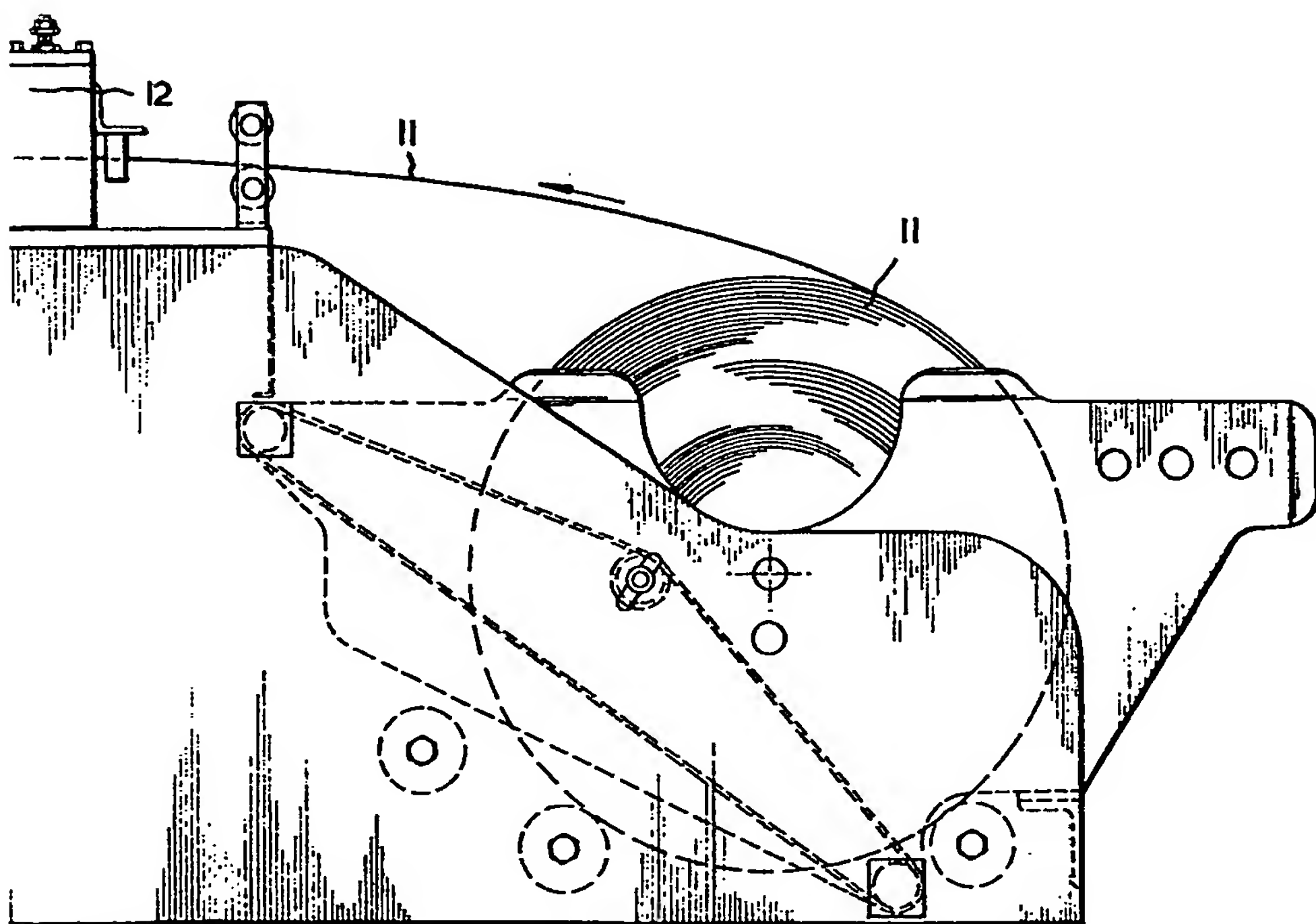


Fig. 2.

